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Vol. 51
No. 20

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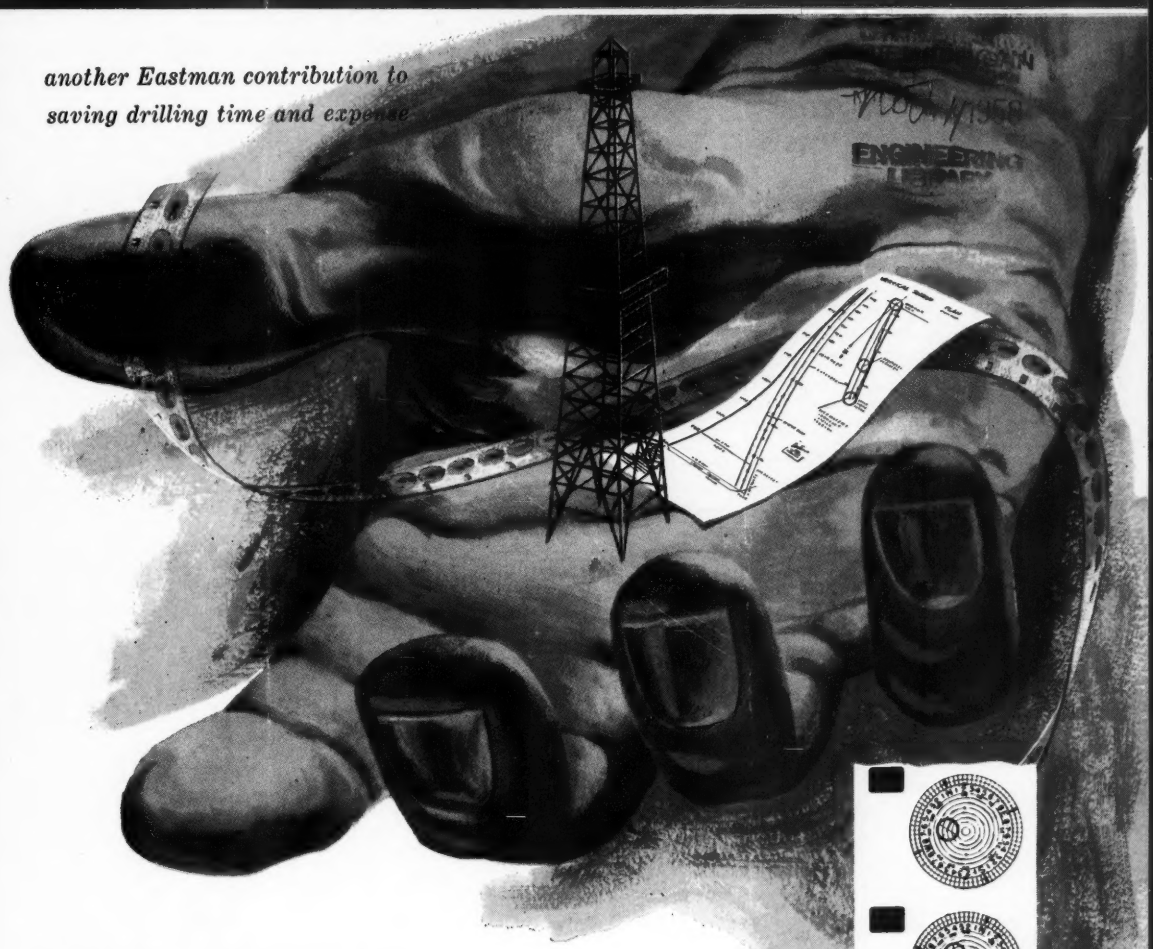

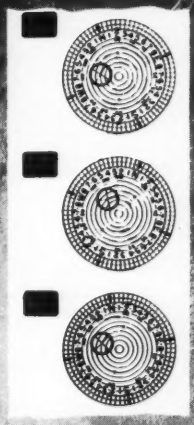

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An Introduction to Computers

by

A. J. Ebersole of The Fluor Corporation, Ltd.

Editor's Note: Few of us know much about computers. Here is a paper presented at the Annual Fall Meeting of the California Natural Gasoline Association, October 9-10, 1958 which describes the functions of the various components of the commonly used calculating devices in language which the uninitiated can understand.

In recent months much has been written in newspapers and periodicals about the many things which computers can do. We are here going to strip the glamour from the computer and attempt to present in a fundamental way exactly what a computer is, how it operates and what it can do.

There are two basic classes of computers, the analog and the digital. We are going to talk about both classes of computers although the emphasis will be on the more versatile digital computer. The analog computer is basically a physical representation of some mathematical function. A simple example, and one which most of you have used, is the slide rule. In this instance, lengths are used to represent numbers. The addition or subtraction of these lengths obtained by sliding the rule back and forth performs the arithmetic manipulations of multiplication and division. Another analog computer with which all of you are familiar is the automobile speedometer. In this case, the speedometer through suitable linkage with the wheels, provides an approximate indication of speed.

Temperature, pressure and flow controllers used in the natural gasoline processing industry are also analog devices. A physical property, such as flow, is measured and the flow meter reacts in some manner which is proportional to the flow of fluid in the measuring device. The movement of the bellows, or the mercury in the meter, is transmitted through suitable linkage for comparison with a preset value in the controller. Any fluctuation from the preset value causes the controller to put out a signal to the control valve which is proportional to the amount of the deviation from the preset value. This is an example of a simple analog computer controlling a part of a process.

Electronic Computers

In automatic electronic analog computers we use a different piece of equipment to store each of the variables. Thus, if you have fifty variables, you would need fifty pieces of equipment to store them. These variables are represented by voltages or other electrical phenomena and each mechanism is physically interconnected in a way which represents the mathematical relationship so that in a relatively short time the simultaneous change of all the mechanisms solves the problem. Analog computers have great utility for single problem, specific applications. However, their versatility and their ultimate accuracy are limited to within 2 or 3 percent.

Digital computers are the so-called "giant brains" which you have read about and which you have seen on display or in photographs. Although newspaper writers and, I must admit, some of the people in the computing business have referred to these machines as "giant brains," I, personally, would prefer to refer to them as "electronic idiots." While these machines can perform a prodigious amount of mathematical computations, they have absolutely no capacity to think, reason, or exercise judgment. They can only do what they have been instructed to do and this set of instructions must describe in great detail, every operation which the computer is to perform.

The Digital Computer

A digital computer has five components. They are an input device, a memory, an arithmetic unit, a control unit and an output device. In order to describe the functions of each of these components, I would like to refer to the ordinary desk calculator with which most of you are familiar. The arithmetic unit of the computer corresponds to the desk calculator. It is in this unit that the mathematical manipulations such as add, subtract, multiply and divide are carried out. The control unit of the computer corresponds to the operator of the desk calculator. The

operator puts the numbers into the desk calculator and controls the operation of the desk calculator in such a way as to perform the desired mathematical manipulations. The control unit of the computer follows a set of instructions and directs the arithmetic unit of the computer in the performance of the desired mathematical functions.

The memory of the computer corresponds to the paper and pencil used by the operator of the desk calculator. The paper contains the written instructions to the operator of the desk calculator and space for intermediate and final results. The memory unit of the computer stores the set of instructions, called the program, the data, and provides storage for intermediate and final results.

The input device takes information which humans can understand and stores this information in the memory of the computer in a language which the computer understands. On output the results of the computation are converted from computer language back to a language which we humans can understand.

Writing the Program

In writing a program for a computer we have to write much more detailed instructions than we do for an operator of a desk calculator. A simple set of instructions for the operator of a desk calculator is illustrated in Fig. 1. Such a set of instructions would be sufficient for the operator of a desk calculator to do the computations which were desired.

However, such a sketchy set of instructions are not adequate for the digital computer. Since the digital computer has no capacity to reason or exercise judgment, every detailed step which it must perform must be written into the set of instructions. As an example, the problem which we have just described for the desk calculator can be written for the digital computer. This set of instructions, called a program, is illustrated in Fig. 2.

The first seven instructions (location 0000 to 0006) are the instructions required to do the multiplication and division illustrated in Fig. 1. The instructions in locations 0007 to 0018 are required to modify the addresses or locations of the data. This essentially makes it possible to handle the data in column form as was done with the desk calculator. The instructions in locations 0019 to 0024 are used to keep track of the number of times the computer has gone through the calculation and to stop the computer when all of the computations have been completed.

Those of you who have some experience with computers will recognize that in order for this program to be valid we would need some shift instructions to keep track of the decimal point. Since this is an elementary discussion I have ignored this aspect for simplicity. I have illustrated with this program the manner in which instructions can be modified. For machines with automatic address modification, this program could be written in about ten instructions.

Certain Commands Are Decision Making

By this example, I have tried to illustrate that the computer has no capacity to reason or exercise judgment—it must be told every step which it must do. However, every digital computer has certain commands which we term logical or decision making. These commands cause the computer to change control in the program if a certain thing happens. For instance, in the example we added one to a tally each time we went through the program. As long as this tally does not exceed the capacity of the register, the computer will ignore the command in location 0021 and repeat the program. However, when the tally is all ones and we add one to it, it then exceeds the capacity of the register and an overflow condition results. The command in location 0021 is now executed and control is changed to the programmed stop in location 0024.

Most computers can compare two numbers and change control in the program if the numbers are either equal or unequal. They can also compare signs of numbers and change control if the signs are different. These types of commands represent the logic of the computer. Again, it

Fig. 1
INSTRUCTION SHEET FOR DESK CALCULATOR OPERATOR

(1)—Multiply column A by column B and record result in column C. (2)—Multiply column D by column E and divide by column C. (3)—Records result in column F.

Column A	Column B	Column C	Column D	Column E	Column F
0.64321	0.85792		0.70532	0.92645	
0.56472	0.69831		0.82641	0.73487	
0.49395	0.96341		0.63721	0.86743	
0.78265	0.63456		0.92136	0.74859	

Fig. 2
INSTRUCTION SHEET FOR DIGITAL COMPUTER PROGRAM

Location	Instruction	Address
	Read into	0000
0000	Clear and Add	0100
0001	Multiply	0200
0002	Store	0030
0003	Clear and Add	0300
0004	Multiply	0400
0005	Divide	0030
0006	Print Results	
0007	Clear and Add	0000
0008	Add	0025
0009	Store	0000
0010	Clear and Add	0001
0011	Add	0025
0012	Store	0001
0013	Clear and Add	0003
0014	Add	0025
0015	Store	0003
0016	Clear and Add	0004
0017	Add	0025
0018	Store	0004
0019	Clear and Add	0026
0020	Add	0025
0021	Change Conditionally	0024
0022	Store	0026
0023	Change Conditionally	0000
0024	Stop	
0025	+0000 00	0001
0026	+9999 99	9996
	Read into	0100
0100	+6432 10	0000
0101	+5647 20	0000
0102	+4939 50	0000
0103	+7826 50	0000
	Read into	0200
0200	+8579 20	0000
0201	+6983 10	0000
0202	+9634 10	0000
0203	+6345 60	0000
	Read into	0300
0300	+7053 20	0000
0301	+8264 10	0000
0302	+6372 10	0000
0303	+9213 60	0000
	Read into	0400
0400	+9264 50	0000
0401	+7348 70	0000
0402	+8674 30	0000
0403	+7485 90	0000
	Transfer Control	0000

only follows the instructions which were written in great detail by the person who programmed the problem.

After this brief description of the computer and how it operates and my reference to it as an "electronic idiot," one might well ask, "Why has the computer become such a powerful force in industry today?" I would like to emphasize that the computer is not a panacea for all mathematical problems. Its power is in problems which are repetitive in nature or in problems which require trial and error solutions. For this type of problem we can afford to spend considerable time in writing and debugging programs since once these programs are written they can be used to do the same calculations with different data many thousands of times. Once programmed, the computer can do these computations in a small fraction of the time required to do them by manual methods. Another great advantage of the computer is the accuracy with which it performs. It has been estimated that a well trained clerk will, on the average, make one error in one hundred operations. Electronic computers are available today that can make ten million operations with no undetected errors.

Speed of Computers

We have talked about the speed of computers, but up to this point we have not qualified in any way the speed of these computers. Computers are generally classified in two categories: medium speed computers or high speed computers. The so-called medium speed computers can perform one hundred multiplications per second while a high speed computer will perform ten thousand multiplications per second. It is by virtue of these speeds that the computer occupies the place it does in industry today. Because of these speeds, it is now possible to do many calculations by rigorous analytical methods which are too time consuming and difficult to use on a routine basis when calculations are done by manual means. Because such problems in the past have been so difficult to solve by analytical methods, short-cut approximations were developed to solve these problems and give approximate answers in a reasonable length of time. Once the problem has been programmed for the computer, an analytical solution to the problem can be obtained in less time than an approximate answer can be obtained by manual methods. This is the power of the computer.

In closing, I would like to emphasize that a computer can do any calculations that a man can do, but it cannot do any calculations that a man cannot do. A man must first write the detailed set of instructions for the computer to follow. The man who writes the program for the computer must have a full understanding of the problem and the mathematics involved as well as an understanding of the computer and its operation. Only then can the computer be used to advantage in supplying better answers in shorter time to problems which the engineer must have solved and upon which he will base his decisions.

Above, H. J. Maxwell of Standard Oil Company of California, president of CNGA. Lower left, R. C. Gentry, also of Standard, chairman of the Fall Meeting Committee. Lower right, E. R. Millett, secretary-treasurer of CNGA.

Discussing the more specific and technical phases of electronic computers at the CNGA Meeting were the following papers:

"Computers in Engineering Design" by Walter L. Coultas of Shell Oil Company which showed the approach that the engineer must take to solve problems with an electronic computer.

"Analog Computers Aid Petroleum Engineers" by Charles N. Worley of Electronics Associates which presented information concerning the operation of the analog computer and pointed out areas of its application in the natural gas industry.

"Calculating Performance Characteristics of Reciprocating Compressors with an Electronic Computer" by G. H. Holliday and W. L. Coultas of Shell Oil Company.

CNGA Meeting Covers Wide Scope

In addition to the symposium on computers discussed on these pages, the 33rd Annual Meeting of the California Natural Gasoline Association held in Pasadena, October 9-10, 1958 provided forums on Testing and Engineering Development; Modern Gasoline Plants — Good Planning Fosters Operating Economy; Plants and Processes; Engines and Compressors.

Among the addresses presented at the two-day meeting were "The International Geophysical Year" by Dr. Joseph Kaplan, chairman of United States National Committee,, International Geophysical Year 1957-1958; "Basic Attitudes—America's Secret Weapon" by Tyler Macdonald, vice president, Hixson & Jorgensen, Inc.; and "The Role of Natural Gas in California's Future Energy Requirements" by W. M. Jacobs, senior vice president, Pacific Lighting Gas Supply Company.

On display were electronic equipment and computers with examples of computer operation.

Petroleum LORE and LINGO

By RICHARD SNEDDON

Volatility

In a preceding chapter there was some elementary discussion of the constitution of petroleum at which time it was pointed out that the principal components were a series of chemical families, classified generally as hydrocarbons. They are so named because they are compounded solely of hydrogen and carbon in various proportions. And it was additionally noted that they varied in form all the way from the simplest of gases through liquids to the most complex of solids. Besides these hydrocarbons, crude oils contain small quantities of oxygen, nitrogen, and sulphur, mostly bound up in organic combinations and generally regarded as extraneous (that's a Latin word for "foreign"). These latter will be of no particular concern here but certain ones which are of especially interesting character will be mentioned from time to time as the occasion warrants. For the moment we shall take a piercing look at one more of the physical qualities of petroleum that is of special interest, namely volatility. This is not only a useful measure of the value of crude oil but is a dominant factor in the refining processes by which crude is resolved into an endless stream of commodities for the uses of industry and society.

What Is It?

Volatility derives its name from the Latin *volere,* "to fly" and it expresses very neatly the tendency of the molecules of a liquid to fly away from the main body, forming gas or vapor, under the influence of heat. It is a peculiar thing about matter that its particles are not nearly so compactly united as we laymen are inclined to believe. The action of heat is to still farther separate these particles and eventually to drive them off altogether in varying quantities depending on the volatility of the substance. This separation of atoms or molecules is the reason that metals expand when they are heated and contract when they are cooled. It explains the difference between gases, liquids, and solids, and it gives the refiner two of his basic refining tools, volatilization and condensation.

Gases and Vapors

Dissecting some of these words before proceeding further, "vapor" is simply an unaltered Latin word that means "gaseous material"; although many of us cling to the idea that it designates specifically a misty or steamy kind of gas that is visible. In medieval times a person could be afflicted with a vapor. This was a sort of ethereal or spiritual sickness, eventually known as melancholia. In modern lingo, we would say that he had the blues. "Atom" is a word that is about due for some revision. It is from the Greek *atomos,* "indivisible" which it certainly isn't any more. "Molecule" is merely a small mass from Latin *moles,* "mass," and "cule," an adopted suffix, meaning "tiny" or something to that effect. An atom is the smallest part of an element and a molecule is the smallest part of a compound which is a combination of two or more elements.

The Building Blocks

In this nuclear age, of course, every one knows that atoms and molecules can be divided into even smaller increments by the process, known as fission, but when that happens, the resulting fragments do not exhibit the same characteristics as the original substances. For most of the everyday purpose of physics and chemistry, therefore, and for our own here, we can accept the fact that atoms and molecules are the smallest particles of elements and compounds that can exist, even theoretically, and still retain all the properties of the originals. Elements are the simple substances like hydrogen, carbon, oxygen, etc., (there are about 100 of them) that are the fundamental constituents of all matter. Compounds are chemical combinations of two or more of these. And "fission," as you no doubt know, is from the Latin *fissio,* "to cleave or split."

Individual Substances

Wherewith, we are now etymologically, if not otherwise, equipped to tackle the subject of volatility boldly and without regard to the consequences. To begin with observe please that pure water is an individual compound, constant in composition and character, and it has a definite fixed boiling point at any specific pressure. Thus, if a kettle of distilled water be heated to boiling at normal pressure (760 mm), it will be found that from the moment it begins to boil until the last vestige of the liquid has been evaporated, the steam as it rises from the surface will maintain a constant temperature of 212° F. The same thing will be found true of alcohol, isooctane, carbon tetrachloride or any other individual compound—each will reach its boiling point and stay there until it is all evaporated. In fact, no matter how long an individual compound may be heated, the temperature of the vapor arising from it never changes at the point of issue.

Mixtures and Blends

When we come to consider the boiling point or points of petroleum, however, we find an entirely different state of affairs. Here we are dealing, not with one single compound, but with a blend of many compounds, each having its own particular boiling point. So, if we heat a vessel containing petroleum, we will find that the temperature of the vapor keeps rising from the boiling point of one compound to the boiling point of the next, throughout the entire series. The succession of boiling points is not quite so clean-cut as the preceding statement might indicate. There is lots of overlapping and general diffusion. One circumstance partly responsible for this is that when several compounds of different boiling points

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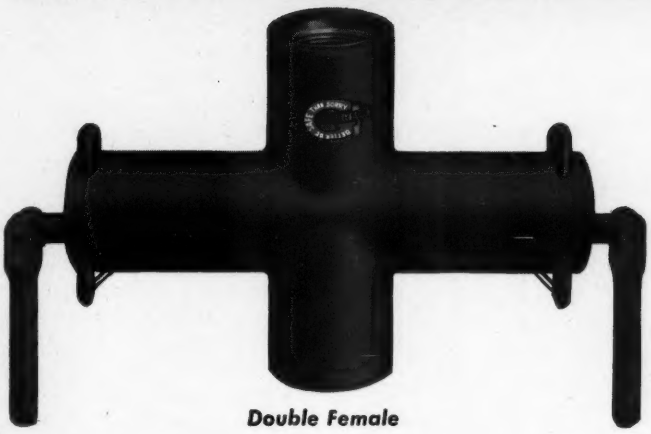
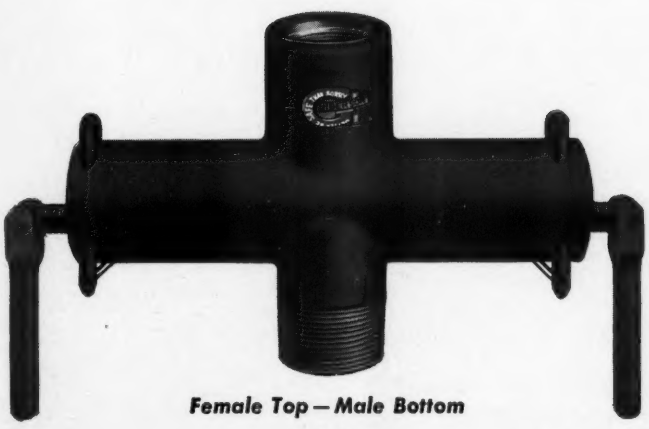


Double Female



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are being evaporated at the same time, each mechanically carries off some fraction of the next in the series. Nonetheless, the range of boiling points determined as suggested is a useful measure of the volatility of any blend or mixture of liquids.

Boiling Point Ranges

What actually occurs when a liquid boils is that, through the continued application of heat, the pressure of the molecules that have been driven farther and farther apart has become sufficiently high to overcome the pressure of the air above. In their effort to escape, the gasified particles have quite a struggle to throw off the liquid cloaks that envelop them. They sail rapidly to the surface, kick their way out of the little balloons, and scamper off madly into space. This creates the phenomenon we know as "boiling," a word that comes to us from the Old French *boillir,* meaning "to bubble." Now, when the vapor of any boiling liquid is cooled, it condenses or reliquefies, so that with a suitable apparatus it may be collected and measured. That, in effect, is just what the oil chemist does when he determines the distillation range of crude oil or any one of its fractions. Since there are a number of ways of contriving this, each having a different purpose, we shall for the moment confine our attention to one of the more common but nevertheless interesting methods.

Condensation

Reliquefying the flying vapors by cooling them, condensation, that is, gets its name from the Latin *condensere,* "to make dense." After the cooling action, the reformed fluid trickles down the inside of the condenser into a receiver, and there we have what is commonly termed a still. The entire process is known as distillation from the Latin *stillere,* "to trickle." The receiver can, of course, be removed at any time and a fresh one substituted, thus providing cuts or fractions, having a definite range of boiling points for some particular industry need. "Fraction" is a portion of the whole from Latin *fractio,* "to break" and, "cut" in this case is also a quantity cut from the total yield.

Refinery Fundamentals

Usually from refining crude oil as it is produced, the first fraction to be removed is the natural gas which is separated from the crude oil partly at the well and is called "casinghead" gas, because it is collected at the head of the casing. Next comes "gasoline" which is a sort of trick word formed by the combination of "gas" already explained; "ol," an abbreviation for "oil"; and "ine," a suffix meaning "of the nature of." Following the gasoline is the kerosene fraction which derives its name from the Greek *keros,* "wax," probably because some of the earlier kerosenes were distilled from waxy crude oil. Then comes diesel oil, taking its name from the diesel engine which took its name originally from the inventor, Rudolf Diesel. Finally, there is nothing left but "residuum" which derives its title from the Latin *residere,* meaning in Americanese "to stay put."

The Engler Test

Getting back to boiling point ranges, one of the more important methods of developing this type of information is the Engler test, called after the man who defined it, and used to determine the distillation characteristics of gasoline, kerosene, and other similar materials. The device used for this purpose is simply a glass flask with an attached side tube that may be connected to a condenser, at the end of which is set a graduated receiver. Into the flask is poured exactly 100 c.cs. of the sample to be tested. The neck of the flask is then fitted tightly with a stopper through which a thermometer is inserted. The side tube is connected to the condenser and the flask is heated. The bulb of the thermometer is placed in the proper position inside the flask to register the temperature of the vapors as they enter the side tube, and the condenser and receiver are both immersed in ice water. As the liquid is heated at a designated rate, the vapors gradually begin to pass into the side tube, are reliquefied by the cold walls of the condenser, and are caught in the receiver as distillate.

The Sordid Details

When the first drop of distillate falls off the tip of the condenser, the operator reads the temperature, and records this reading as the "initial point" of the liquid. The distillation is continued, with temperature readings being made as each 10 c.c. portion of distillate is collected. It will be remembered that the original charge was 100 c.c. such readings being reported as 10%, 20%, 30% point and so on, up to 90%. After this, the highest temperature reached is noted, that is, the evaporation point of the last minute drop of material in the flask. This is registered as the "end point" of the sample, and the distillation is complete. There is always a small distillation loss. That is to say the entire 100 c.c. of original sample is not fully recovered, and this distillation loss is also recorded.

Distillation Curve

The chemist now has in his possession two sets of figures—one indicating quantities distilled over, and the other a record of the temperatures at which these quantities were obtained. By plotting one against the other he derives a curve, known as the distillation curve, which to the experienced operator conveys quite a story. In the first place, a mere glance at the curve is sufficient to tell him whether or not, if the sample is a gasoline, it contains sufficient low boiling material to permit easy starting in cold weather, or conversely, during hot weather or during driving periods in high altitudes, contains too much low boiling material, and might therefore cause vapor lock. By a study of the forepart of the curve he can tell whether or not a gasoline is so constituted as to permit the requisite flexibility in motor operation—that is quick acceleration, pick-up, or generally speed change. The latter part of the curve tells him whether or not a gasoline is capable of uniform atomization, might cause excessive dilution, or has sufficient available calorific value to yield the ultimate in power and mileage. These are the main points of interest in a gasoline distillation test, so far as the salesman is concerned. It must, however, be remembered that the details of the performance are much more exacting than this brief account would indicate, and that the results of such tests have many other important uses which time and space will not permit us to discuss here.

Flash and Fire

Other volatility tests of extreme importance are the flash and fire point tests, used to determine the temperature at which a petroleum product will first flash when it comes in contact with an open flame, and finally, the temperature at which it will burn continuously, when once it has become

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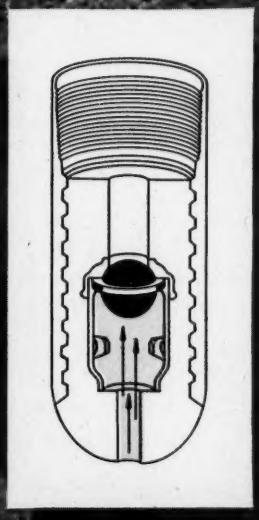

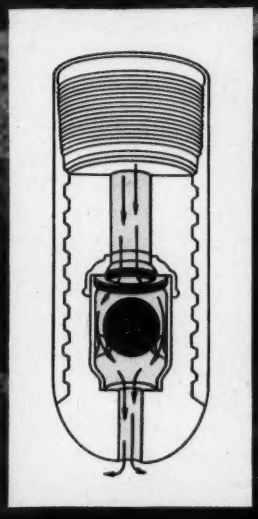

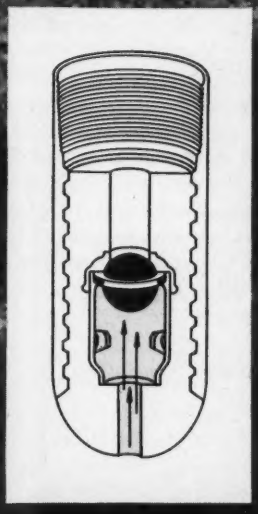

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Ample passageways are provided for the cement slurry, which cannot erode or damage either the protected sealing ring or the revolving ball as it rests on strong fingers in the Bakelite valve cage. When cementing is completed and pump pressure is stopped...

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...the ball floats upward to seat and seal instantly against the recessed sealing ring. There are no aluminum parts or steel springs to drill up — only Baker concrete and Bakelite which break up into small fragments and circulate out of the hole.

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ignited. Since the flash point of a substance varies with the apparatus and procedure employed in making the test, it is evident that results should always be referred to the specific method used for their determination. The purpose of the flash point test depends altogether on the commodity. For instance, in the case of kerosene it is normally required to establish the hazard attendant on its use, and the degree of care with which it must be handled, while in the case of lubricating oils, it determines fairly satisfactorily relative rates of consumption, provided the oils being tested are composed of the same types of hydrocarbons. There are two general species of flash point testers—the closed cup, and the open cup, and the former is almost invariably used when the fire or explosion hazard is the main consideration. When the initial boiling point of the material to be tested is sufficiently high to eliminate the explosive hazard under ordinary conditions, such as in the case of lubricating oils, the open cup type is used. It is hardly necessary to explain the detailed variations in each class of tester, and this discussion will therefore be confined to a general description of the two types.

The Closed Cup

The flash points of petroleum products vary over a wide range with naphthas and gasolines having the lowest flash points of the liquid fractions, and lubricating oils the highest. In between lie the kerosenes, gas oils, residuums or fuel oils, and other products such as cleaning solvents, paint thinners etc. Closed cup testers, as we have already explained, are used wherever the handling of the material introduces an explosion hazard, and are designed to define the conditions under which a flash might be expected to occur in actually storing or working with the material. They are constituted essentially of a bath, either oil or water, in which a small closed vessel containing a certain volume of the liquid to be tested is immersed. This bath is heated at a prescribed rate, and at definite temperature intervals, the closed vessel is opened long enough to permit the introduction of a small pointed flame. When the vapors from the sample have sufficiently enriched the air in this small vessel to cause a miniature explosion, the flash point has been reached, and the temperature is noted and recorded.

The Open Cup

In the open cup apparatus, as the name implies, the vessel containing the sample is open to the atmosphere, and a measured quantity of oil introduced into this container is heated at a specified rate. At definite temperature intervals, a small flame is passed across the surface, and when the vapors ignite, and continue to burn for a period of five seconds, the fire point temperature is read off. Obviously, the fire point of any sample will be higher than the flash point. The significance of flash and fire test results is somewhat apparent, but it might be desirable before dismissing the subject entirely to dwell briefly on the general application of such results.

Explosibility

There is no single test that can give absolutely reliable results as to the probability of explosion or fire in the handling of any commodity, but it is certain that an intelligent operator, who knows the flash point of the material he is using, is not going to expose that material to temperatures anywhere nearly approaching its flash point if there is any possibility of ignition by spark or other means. The flash point thus does become a guide, and a very essential one, to the person or persons who are obliged to handle inflammable materials. Just as a matter of information, it might be pointed out that naphthas and gasolines will readily flash far below ordinary atmospheric temperature, when brought into contact with a hot spark or flame, and that when gasoline vapor is allowed to collect in a closed room, the impregnated air may be explosive when only one percent of gasoline vapor is present. From one to six percent is roughly the explosive limit of gasoline in air admixtures, and the safety-minded home owner should be alert to discourage any operation that might tend to the laying of such a death trap.

Flash Point & Fire Hazard

It is for this reason largely that the progressive oil companies manufacture cleaners' solvents, mineral turps, special naphthas, and other commodities from which the low boiling, low flash-point material has been removed. In the early days of the kerosene lamp, explosions were all too frequent, simply because at that time, the significance of flash point tests had not been fully realized, or the refining business had not advanced sufficiently to permit complete elimination of the low flash point materials. The normal closed cup flash test on kerosene now ranges between 100 and 160°F. Gas oils and fuel oils vary from 150 to 300°F., and the flash points are again determined for the purpose of defining the fire hazard. Large commercial buyers usually specify minimum flash points, when the contract to purchase these products is originally drawn up, and the limits so specified are definitely determined by the purpose to which they are to be applied.

Lube Oil Fire Tests

Fire tests on lubricating oils and high boiling materials are used more for the purpose of yielding information as to constitution, and as we have indicated, in the former case give information as to relative rates of consumption when the oils are known to be of similar composition. Lubricating oil fire tests vary widely, but may be said to range roughly between 350 and 650°F. It would seem natural to suppose that the fire point has a definite relation to the volatiilty or boiling point, and hence to consumption, and other conditions being equal, the oil with the higher fire point will display the greater resistance to heat.

Vapor Pressure Tests

The subject of volatility can not be dismissed without a brief word on the vapor pressure test. This test merely measures through the use of a gauge the pressure developed by the rising vapors, usually at 100°F., and thus establishes very accurately the relative rates at which petroleum products will incline to evaporate under any particular set of conditions. It is normally expressed in pounds per square inch, and varies from about 7 pounds in motor gasoline to as high as 40 pounds in unstabilized natural gasoline. The permissible limits are governed very much by circumstances. For instance, in territorial sections of the country that are subject to unduly high temperatures, naturally a low vapor pressure gasoline is demanded, while in the cooler areas, the vapor pressure might be increased without danger. Transportation companies utilize vapor pressure tests to specify the type of container in which the commodity may be shipped, since obviously such con-

tainers must be sufficiently strong to stand the maximum pressure developed by temperature elevation during shipment. Oil companies and others concerned with the storage of inflammable volatile materials, must know their vapor pressures so that adequate precautions may be taken to avert fires, and to prevent undue evaporation losses in storage.

Evaporation & Conservation

Most of the large oil companies employ conservation engineers for the express purpose of determining where evaporation losses are being sustained and what must be done to prevent them. Some years ago, during an overproduction period one producing organization had considerable quantities of oil in storage and much of it on the light side. To minimize loss on this oil a system was devised of cooling exhaust gases, rich in carbon dioxide, and directing them into the tops of the storage tanks. Carbon dioxide is not only heavy but is also non-inflammable, so it acted as a blanket to hold evaporation in check and at the same time was an excellent fire preventive. This system has been used too very effectively on oil tankers.

Unpleasant Coincidence

Incidentally, a little over 30 years ago, a California oil company was the victim of a most peculiar coincidence when on the same day, two tank farms over 200 miles apart were set afire by lightning. Some twenty million barrels of oil were lost in these fires, and a most unexpected circumstance was that in one of them at least several large tanks of gasoline burned quietly at the vents, like huge lamps, while all around them crude oil tanks intermittently belched frightening gusts of flame and smoke and spilled searing streams of burning oil over the adjacent country side. The simple explanation of this was that the gasoline being extremely volatile, the spaces in the tops of the tanks contained a mixture that was just too rich to explode—the explosive limits of air-gasoline mixtures being as has already been intimated between 1 and 6 per cent.

Ducks Are Ignoramuses

In one of these tank farms, by the way, were several large earthen reservoirs, in which were stored several million barrels of oil. When the fire took place, most of this was lost, and the wooden roofs were completely burned off. A small quantity of unconsumed crude oil remained, however, and for some time the reservoirs were left uncovered. Now, I had always thought that ducks could sense the difference between water and oil instinctively, but I guess not, for they swooped down by the dozens, landed on this goo and never rose again. When kind hearted oil men rushed the construction of a protective wire screen above the oil, the birds still swooped down and broke their lovely necks on the screen. From which we deduce that stupid ducks are perhaps even more stupid than stupid people.

DID YOU KNOW — that during 1957 the oil industry supplied 69 percent of the nation's energy. In California the industry supplied the state with about 95 per cent of its energy.

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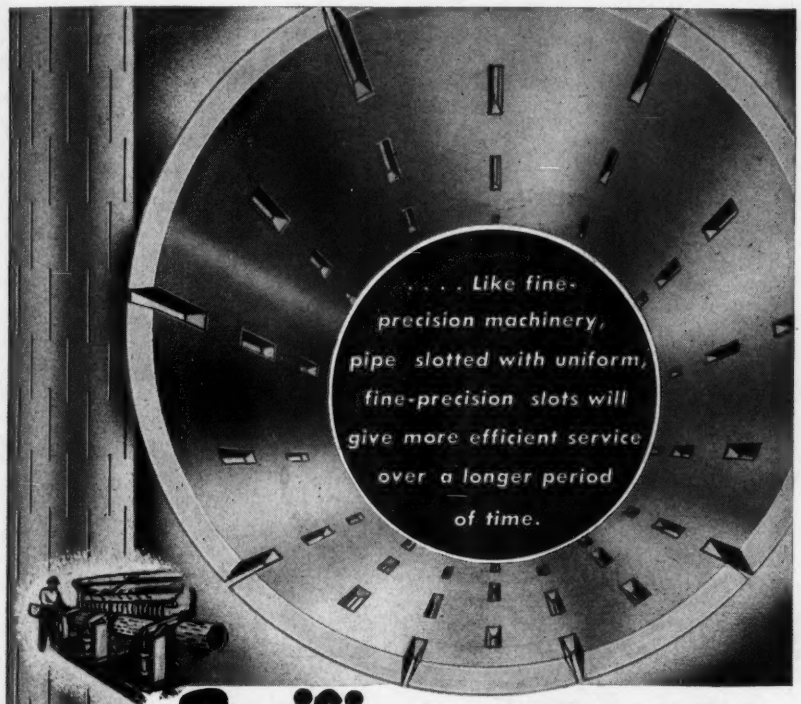
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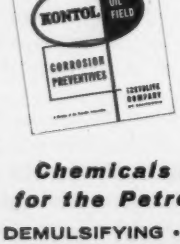

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LOS ANGELES BASIN

Montebello Test

Rothschild Oil Company is grading location for La Merced No. 1, a 3800-foot test located 2760 feet south and 935 feet east from the northwest corner of Section 1-2s-12w.

Newhall-Potrero Extension Test

Shell Oil Company is grading roads and location for Shell-Ferguson No. 1-7 in Section 36-4n-17w. The test, located on a 560-acre lease, is slated to be drilled to 12,000 feet. Location is in the northwest one-quarter of Section 36.

Temple-Vermont Area

Guiberson and Burke, after a test of upper showings which proved to be wet, is plugging to redrill Texam-Stolkin-Culter No. 1 located in Section 19-1s-13w. Present depth of the hole is 6544 feet with 5½" casing cemented at 4900 feet.

Rancho-Hillcrest Golf Club

Signal Oil and Gas Company has skidded the derrick a few feet to the south of Rancho No. 1 and is drilling below 1000 feet on Signal-Richfield-Rancho No. 2, located 618 feet south and 612 feet east from the intersection of Pico Boulevard and Peg Place. Rancho No. 1, after successful production tests, is standing shut in. On the Hillcrest Golf Club to the west of the Rancho Club, Signal is drilling below 10,000 feet on Signal-Richfield-Hillcrest No. 1.

Tapia Well Abandons

Crown-Huntington Oils, Ltd. has abandoned its Dodge No. 2 well at a depth of 1320 feet. Located on Section 30-5n-16w, location falls 127 feet north and 302 feet east from the south-quarter corner of Section 30.

Wilmington Test

E. C. Simmons is preparing to spud in on C.N.C. No. 1 on Section 35-4s-13w. Location of the well is 130 feet northerly and 155 feet easterly from the intersection of Harbor Ave. and 15th Street. Bud Albright is the Engineer.

SAN JOAQUIN VALLEY

Wheeler Ridge Area

Verde Enterprises, Operator for Dalton - Green et al has abandoned ROCO-Springman No. 38-26 in Section 26-11n-20w. The test was drilled to a total depth of 6470 feet and an electric log was run before final abandonment.

Reserve Oil and Gas Company's R-S-T No. 68-30 in Section 30-11n-19w was completed and shut in with the shut-in tubing pressure at 2800 psi. Drilled to 8784 feet and with 7" casing cemented at 8707 feet, tests through a 16/64" bean indicated a 180 b/d well of 60 gravity clean oil.

Gas Test Abandoned

In the Chowchilla area in Madera County, Chowchilla Gas Company has abandoned Redman-Stone No. 3-17 in Section 17-10s-14e after drilling and coring to 3050 feet.

La Panza Well Abandons

Shell Oil Company's San Luis Obispo County wildcat, Ferguson No. 87X-14, in Section 14-30s-17e has been abandoned at a total depth of 4989 feet.

Elkhorn Valley Abandonment

Six miles southwest of Taft in the Elkhorn Valley area, San Luis Obispo County, Richfield Oil Corporation has abandoned Elkhorn Unit No. 25-3 in Section 3-11n-25w. The test was drilled and cored to 3143 feet.

San Joaquin County Wildcat

Porter Sesnon et al is rigging rotary in Sesnon-Vernalis Unit 3 well No. 64-15 in Section 15-3s-6e. This location is approximately one mile northwest of its Sesnon-Giambastini No. 33-22 in Section 22-3s-6e, which is in the process of being completed as a gas well.

North Tejon Wildcat

Standard Oil Company of Calif. has staked location for Universal Consolidated-S.P. No. 338, located 660 feet north and 660 feet west from the south-quarter corner of Section 9-11n-19w. The location falls one and one-half miles northeast of the North Tejon Field production.

Tulare County Test Abandons

Trico Oil and Gas Company has abandoned Tulare Farms well No. 8 in Section 26-24s-23e. Located on the easterly flank of the Trico Gas Field, the test was drilled to a total depth of 7000 feet.

Vallecitos Completion

Coast Exploration Company and Grover Collins completed their initial try in the area, Bryant-USL No. 16A-28, in Section 28-16s-11e. Good for 500 b/d of 32 gravity oil, cutting 1 per cent sand and water, the well later flowed thru a 28/64" bean at a 670 b/d rate of clean oil. The well is bottomed at 2947 feet and has 7" casing cemented on bottom, with 117 feet of selective perforations within the interval of 2853 to 2652 feet. Location is being graded for a second well, Bryant-USL No. 26X-28, one location to the south of the completion.

Mountain View Well Abandons

Approximately three miles southwest of the Mountain View production, The Termo Company has abandoned its

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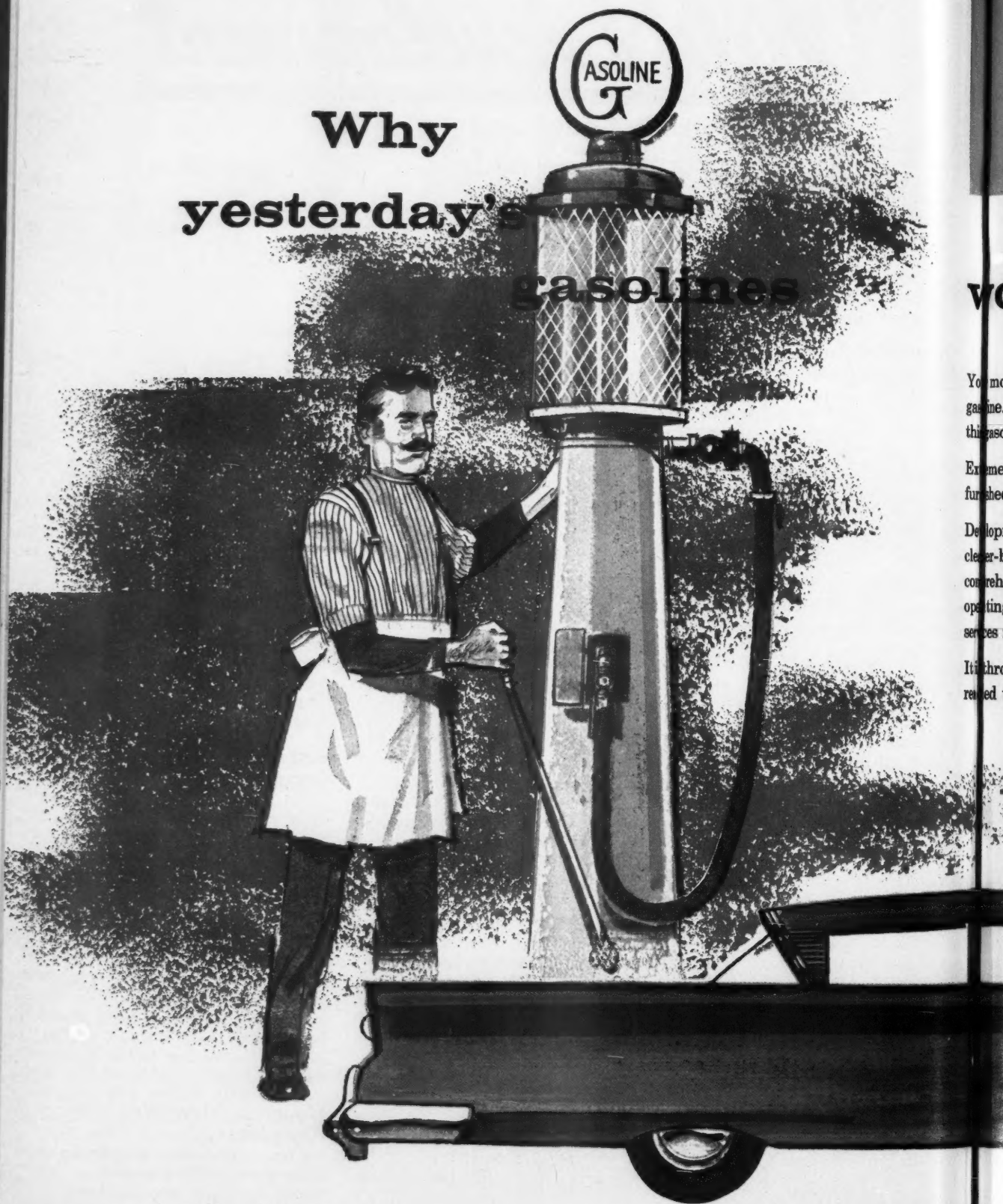

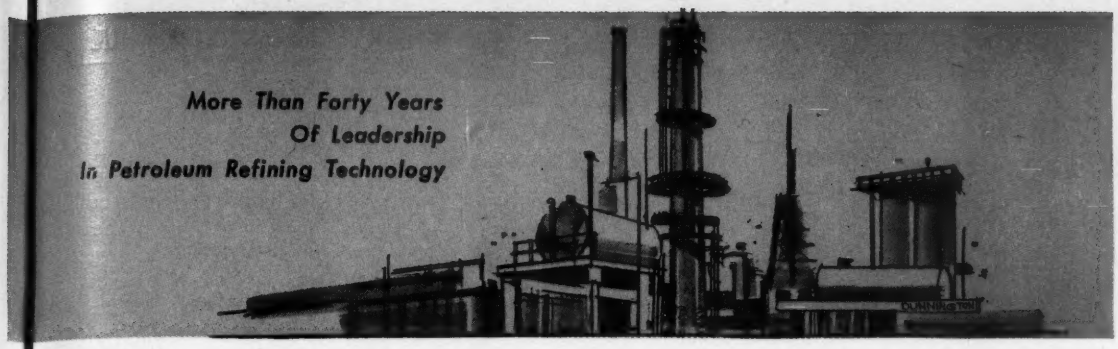

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Lamont-Sunray No. 53X well, located in the northeast one-quarter of Section 12-31s-28e. The test was drilled and cored to 13,005 feet.

Curry Mountain Well Abandoned

In the Curry Mountain area in Fresno County, General Petroleum Corporation has abandoned Standard-G.P. No. 52-9. Located in Section 9-22s-15e four miles south of Jacalitos Field production, the well was drilled to 5258 feet and on a test of the interval 5017-5228 feet recovery was mud, water and drilling fluid. Slight showings of gas were noted.

McVan Well Abandons

Logging the Vedder Sand at 3150 feet, which proved to be wet, the S. P. Lipoma Company's well C-1 in Section 14-27s-27e continued drilling to a total depth of 3293 feet and was plugged and abandoned.

West Tejon Hills Test

G. A. Grober is drilling G.B.M.C.-Richfield No. 1 located in the northeast one-quarter of Section 8-11n-18w. The location is approximately two miles south of Comanche Point and two miles west of the Tejon Hillls production.

Buena Vista Hills Completions

Richfield Oil Corporation's ROCO-United-A No. 554, extension test of the 555 Pool in Section 20-31s-23e, was completed from a plugged depth of 5410 feet flowing at a 2000 b/d rate through a 1½" bean with a 0.7 per cent cut. The bean was reduced to a 13/64" and flow was 325 b/d of 31 gravity oil, cutting less than 1 per cent. Total depth of the well is 5757 feet with a bottom plug at 5410 feet and 7" casing cemented at 5144 feet.

Standard Oil Company of Calif. completed its extension test, well No. 531-29B in Section 29-31s-23e, flowing 948 b/d through a 24/64" bean; with the bean reduced to a 14/64", the flow was 420 b/d of 28 gravity clean oil. Depth of the well is 5625 feet with 7" casing cemented at 5201 feet.

Tidewater Oil Company completed TOCO-ROCO No. 525 flowing at a 2900 b/d rate through a 74/64" bean; with the bean reduced to a 32/64", the flow was 1968 b/d rate of 29.7 gravity oil, cutting 0.1 per cent. Located 1320 feet north and 1320 feet east from the southwest corner of Section 20-31s-23e, the well is bottomed at 5615 feet and has 7" casing cemented on bottom and perforated at various intervals within 5555 to 5146 feet.

Ten Section Wildcat

Northwest of the Ten Section field, Shell Oil Company will drill K.C.L. No. 73-23, located 1650 feet south and 990 feet west from the northeast corner of Section 23-30s-25e.

COASTAL AREA

Arroyo Grande Extension

Frank Goldman, Bakersfield operator, has staked a location for Hyla-Callender No. 1 in Section 5-32s-13e. Located 1500 feet south and 1490 feet west from the northeast corner of Section 5, the well is an easterly extension test of the Arroyo Grande field.

Ventura County Wildcat

In the Reasoner Canyon area, Wayne Loel and E. B. Hall are grading roads and rig site for Government No. 1, located 960 feet north and 650 feet west from the southeast corner of Section 20-5n-18w. The well will be a 2000 foot test and is approximately two and one-half miles north of the Temescal Field.

Carpinteria Wildcat Test

Guiberson-Cudahy is grading roads for Shepard No. 1, a 5000 feet test located 1500 feet north and 100 feet west from the southeast corner of Section 29-4n-25w.

Strathearn Dome Well

Franco Western Oil Company has announced a location for Smith No. 61A-11, a 5000 foot test located 500 feet south and 1800 feet west from the northeast corner of Section 11-2n-19w.

Gaviota Area

L. E. Broadhurst's Mercedes-Fox No. 1 well in Section 35-5n-32w drilled to 4048 feet and suspended operations. No tests were made, although some showings were reported to have been logged in the Vaqueros and Sespe. The rig was moved to Section 31-5n-32w and Mercedes-Fox No. 2, after drilling to 1465 feet, is fishing drill pipe.

NORTHERN CALIFORNIA

Tehama County Gas Test

In the Orland area, Humble Oil & Refining Company is preparing to spud Alberico No. 1, located 660 feet south and 660 feet west from the northeast corner of Section 30-23n-2w. Tagged as a core hole, the test is some five miles south and east of the South Dome Gas Field and is scheduled to go to approximately 7500 feet.

Port Chicago Gas Test

Western Petroleum Corporation is ready to spud Stoeckle No. 1, a gas test located 1200 feet south and 2100 feet west from the northeast corner of Section 12-2n-2w, approximately five miles east of the town of Martinez. Kruse Drilling has the drilling contract and W. C. Bradford is the Petroleum Engineer.

Butte County Wildcat

Davidor and Davidor is grading location for Slusser No. 1, a gas test three miles south of the Durham Gas Field. The test is located 150 feet north and 50 feet east from the south one-quarter corner of Section 29-20n-1e. W. S. Payne, Jr., will handle the petroleum engineering.

Glenn County Test Abandons

R. W. McBurney has abandoned Reserve - McBurney - Humble No. 9-1 in Section 9-21n-2w in the Willows area. The test reached a total depth of 6515 feet before being abandoned.

River Island Well Tests

In the River Island area in Sacramento County, Brazos Oil and Gas Co.'s S. R. Unit No. 1 in Section 17-4n-4e is preparing for a production test. Total depth of the well is 10,902 feet with 5" casing cemented on bottom.

Beehive Bend Extension

Southwest of the Beehive Bend Gas Field, the Balken Corporation is preparing to spud Section Thirty Two Unit well No. 2. Location of the test is near the center of the southeast-quarter of Section 32-20n-2w in Glenn County.

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East Boundary Butte Completion — Arizona

Humble Oil & Refining Company has completed and shut in its No. 1 Navajo-E in Section 10-41n-28e from a depth of 5410 feet. On an eight hour test the well flowed 185 barrels of oil and five barrels of fresh water thru a 5/16-inch bean. The 5½" casing is cemented at 4893 feet and perforated from 4726 to 4772 feet. Humble's second test in the area, No. 2 Navajo-E in Section 9-41n-28e is drilling below 4075 feet.

Superior Suspends — Arizona

The Superior Oil Company has suspended operations on Navajo-H No. 1 in Section 10-41n-30e, after drilling slightly below 6000 feet. Superior's second test, Navajo-H No. 2 in Section 16-41n-30e, has been spudded and is drilling with the depth being withheld.

Montezuma County Test — Colorado

A possible Paradox discovery for the California Company is indicated by a pumping test on its Calco-Superior-Ute Tribal No. 2 in Section 15-33½n-20w. Although testing continues, recovery was 90 b/d oil and 20 barrels of water. Depth of the hole is 6055 feet with 5½" casing cemented at 6052 feet and perforated from 5761 to 5838 feet.

White Mesa Deep Test — Utah

Continental Oil Company's deep test of the White Mesa Field, Navajo-C No. 7 in Section 3-42s-24e, reached a total depth of 7000 feet and is running logs. On a formation test of the interval 5905-6071 feet, oil was recovered at the rate of 40 barrels per hour.

Coalbed Canyon Test Abandons — Utah

Kern County Land Company's Coalbed No. 6 well in Section 14-35s-25e in the Coalbed Canyon area in San Juan County, has been abandoned. The well, a Paradox test, reached a total depth of 5860 feet.

Johnson Creek Well Abandoned — Utah

Standard Oil Company of California has abandoned Johnson Creek No. 2 at a depth of 6010 feet. Location of the test falls in the NE¼ NE¼ of Section 32-35s-25e.

OTHER STATES

Silvana Area

Approximately fifteen miles north-northwest of Everett, Washington, the Standard Oil Company is drilling below 5992 feet on "Silvana Community" No. 12-1 in Section 12-31n-4e.

ALASKA

Kenai Peninsula — Alaska

In the Kenai Peninsula area, Standard Oil Company and Richfield Oil Corporation have announced a location for Swanson River Unit well No. 4 to be drilled 660 feet north and 198(feet west from the southeast corner of Section 16-8n-9w. The test is approximately one and one-half miles to the southwest of Richfield's discovery well, Swanson River Unit well No. 1. Standard Oil Company and Richfield Oil Corporation's Swanson River Unit No. 3 in Section 23-8n-9w, drilled to 11,209 feet and is troubled with loss of circulation.

Cape Fairweather

Colorado Oil & Gas Corporation and Frankfort Oil Company's Yakutat No. 3 in Section 3-28s-34e, an 11,000-foot test, is drilling ahead below 10,315 feet.

Kanatak Area

Humble Oil & Refining Company is changing and conditioning mud on Bear Creek Unit No. 1 in an attempt to regain circulation. Located in Section 36-29s-41w, present bottom of the hole is 12,288 feet.

Iniskin Bay— State of Alaska

Alaska Consolidated Oil Co., operating under the name of Iniskin Unit Operators, Inc., 80 Wall Street, New York, has purchased the rig and equipment from the Havenstrite Oil Company to drill San Antonio-Iniskin No. 3, a new test scheduled to be drilled to 10,000 feet or deeper in township 5s, range 23w, Seward Base Meridian. New operators took over 51,000 acre tract from the Havenstrite Oil Company and are now rehabilitating roads, camp site and equipment. Coastal Drilling Co. will furnish the crews and Robin Willis to be the consulting engineer and geologist. This new test will be located close to the Havenstrite well which was drilled to 9745 feet and in which oil and gas showings were reported.

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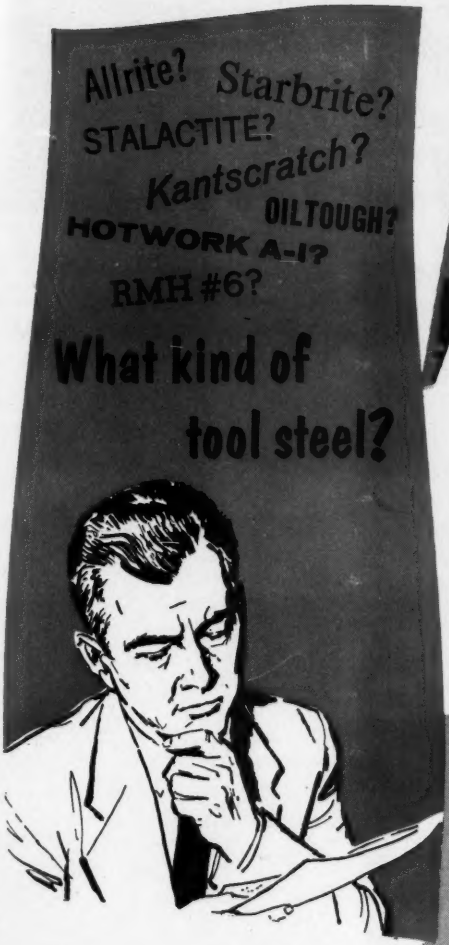
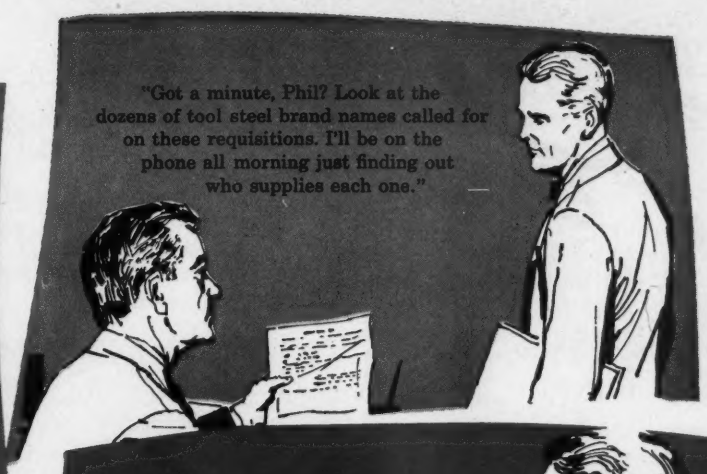
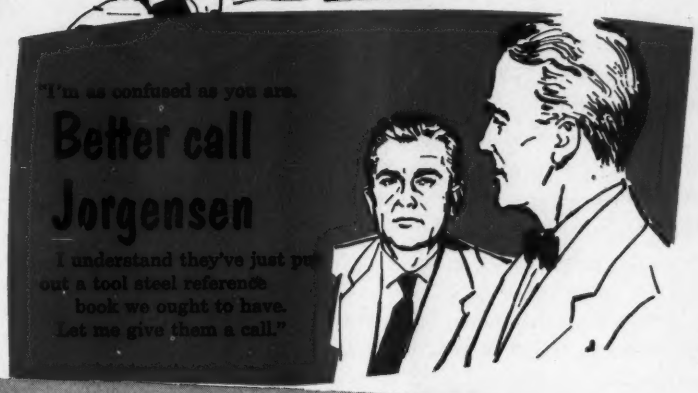
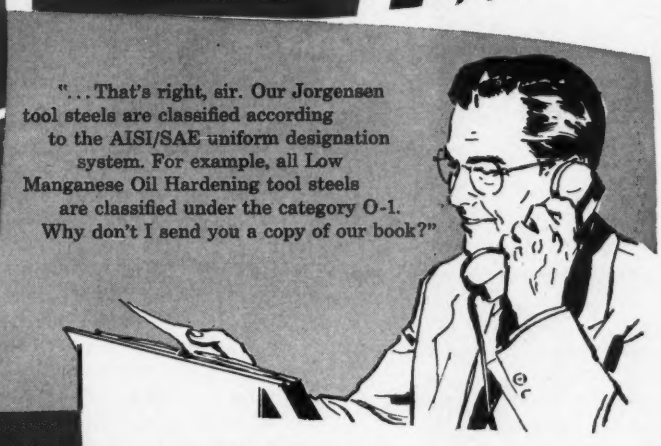
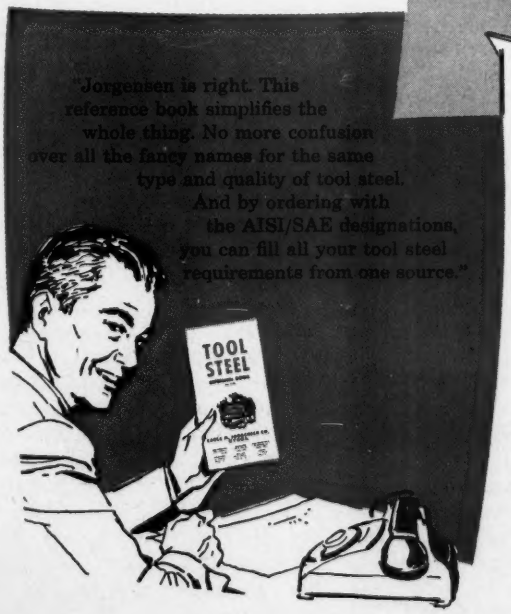



"Got a minute, Phil? Look at the dozens of tool steel brand names called for on these requisitions. I'll be on the phone all morning just finding out who supplies each one."


"I'm as confused as you are.
Better call Jorgensen
I understand they've just put out a tool steel reference book we ought to have. Let me give them a call."


"... That's right, sir. Our Jorgensen tool steels are classified according to the AISI/SAE uniform designation system. For example, all Low Manganese Oil Hardening tool steels are classified under the category O-1. Why don't I send you a copy of our book?"


"Jorgensen is right. This reference book simplifies the whole thing. No more confusion over all the fancy names for the same type and quality of tool steel. And by ordering with the AISI/SAE designations, you can fill all your tool steel requirements from one source."
TOOL STEEL

...call or write today for Jorgensen's Tool Steel Reference Book No. T-58
...for technical assistance, call on Jorgensen's tool steel specialists

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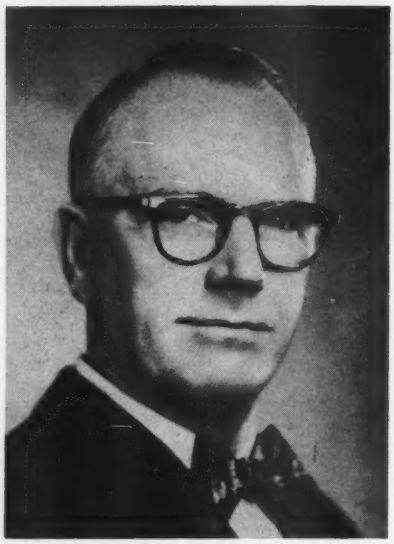
TULSA
7311 East Pine St.
TEmple 5-1511

Personalities IN THE NEWS

Reed Roller Bit to Expand Activities

California oil activity is due for steady acceleration in the years ahead and the Reed Roller Bit Company is planning on putting many dollars to work to become an even more vital part of the scene. This was the statement made in Los Angeles by John F. Maher, newly elected president, at a meeting of Reed's sales division 60 personnel from the west coast. He commented that Reed's division offices and warehouse in Los Angeles will be renovated and modernized but reminded that this is only superficial. He said in addition that California will be the pivot point for Alaskan oil activity.



John F. Maher

The real reason the company will progress rapidly, Mr. Maher continued, is the launching of a concerted and widescale research and development program to guarantee the best possible equipment at all times to the driller. This is being augmented by new aggressiveness in field service.

Other officials attending the meeting in addition to R. C. Huffines, California division manager, included Howard B. Book, vice president, sales; Wiley B. Noble, vice president in charge of engineering; and Jack Knight, administrative assistant.

In Memoriam

ED. LLOYD

We deeply regret the passing of Edwyn C. Lloyd, age 62, at two a.m. October 16th. Ed, who was widely known and liked in the oil industry, was born in Hamilton, Ohio and lived for many years in Uniontown, Pennsylvania, before going to Chicago where he was on the staff of the Chicago Tribune until he moved to Los Angeles in 1926. He covered the boom days of the oil industry of California for the National Oil Derrick and since 1941 was oil editor for the Los Angeles and San Francisco Examiners. He was a past officer of the Petroleum Writers Association.

We extend our deepest sympathy to his widow, the former Vivian Grey, and his son and two daughters.

BEN H. VAN DER LINDEN

Ben N. van der Linden, first exploration and production chief of the Shell companies in this country and world-wide head of production activities for the Royal Dutch-Shell Group until his retirement in 1940, died Sunday, October 5, while on a visit to Holland. He was 78.

In 1913 van der Linden was made head of exploration and production activities of the new Shell company in California and is generally credited in the industry with establishing the first major-company production engineering department. During the period of World War I, he hired as young production engineers a number who were to distinguish themselves later: the late F. E. Rehm, who became Shell vice president of personnel and industrial relations; T. E. Swigart, who became a Shell production vice president and later president of Shell Pipe Line Corporation until his retirement a few years ago; J. E. (Brick) Elliott, inventor of the Elliott core-barrel; and the late A. W. Ambrose, who became president of Cities Service Oil Company, of Bartlesville.

The accomplishment which perhaps gave Mr. van der Linden most satisfaction was the bringing in of the prolific Ventura, California, field in March 1922. A long line of previous operators had tried and failed in Ventura, and Shell's eventual success in bringing the field into production after five years of dry holes was due almost entirely to van der Linden's unwavering faith in the face of reverses and skepticism.

N. B. LLEWELLYN

N. B. Llewellyn, San Joaquin Division Manager, Purchase and Stores Department, Standard Oil Company of California, Western Operations, Inc., died on October 8th in Westside District Hospital, Taft, following a heart attack suffered six days previously. He was 58 years old.

Mr. Llewellyn, well known within the oil equipment supply industry throughout Southern California, had been an employee of Standard for 33 years.

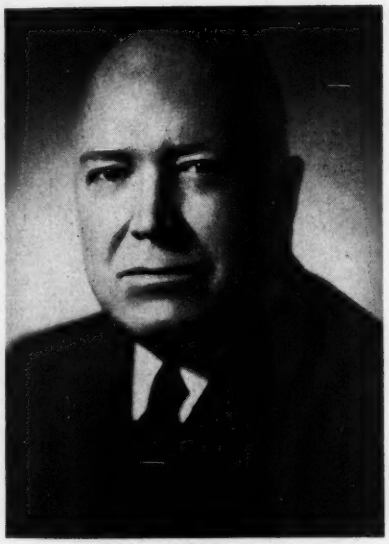
BJ Service has named **C. C. B. Moody** as assistant to vice president of engineering and development, **M. B. Riordan.** In making the announcement, executive vice president and general manager **J. B. Merritt** pointed out that Moody takes to his new position a background of experience in various engineering, operational, and supervisory duties with the company.

A graduate of California Institute of Technology with a B. S. in M. E., Moody joined BJ in 1948 as a development engineer. After a number of years in such development programs as adapting the shaped charge principle for well perforating, he became supervisor of BJ's wire line engineering group. Switching to a field superintendent's job in 1954, he has since held various operational positions in the company, most recently as executive assistant to **W. T. Box,** vice president and manager of operations. From his office in Long Beach, Moody will help direct BJ research and development activities there and in Breckenridge, Texas.

C. L. "Slim" Nelson has been appointed a Four Corners warehousing and service representative for B & W, Inc., manufacturers of primary cementing tools. Nelson is a pioneer in oil field services, with warehouse and yard facilities on Shiprock Highway in Farmington, New Mexico. He will stock a complete line of B and W scratchers, centralizers and holding devices, offering prompt delivery and installation services. Nelson will, of course, continue his pipe straightening and related oil industry services.

R. W. Rager, vice president-manufacturing, U. S. Steel's Oil Well Supply Division, recently announced the appointment of **Charles E. Rocheville** as manager of the division's Neilsen Pump Works at Long Beach, Calif. Rocheville joined Neilsen Pump Works in 1936 in the engineering department. He was appointed assistant to works manager in 1952 and manufacturing coordinator of sub-surface equipment in 1955.

ASSOCIATION AFFAIRS



Frank M. Porter
President of A.P.I.

A.P.I. Meets in Chicago

The 38th Annual Meeting of the American Petroleum Institute will meet in Chicago, November 10-12, 1958. Group sessions and committee meetings on production, refining, marketing, transportation, finance and accounting, and non-divisional divisions will be held during these days with refining committee meetings starting on the 6th. Registration will begin on Sunday the 10th.

Prominent leaders of industry and education will address group sessions and many special events will be held, including annual dinners of various clubs connected with the petroleum industry.

Technical Papers Feature Society of Petroleum Engineers Meeting

The Annual Fall Meeting of the Society of Petroleum Engineers, Southern California, was held at the Biltmore Hotel, October 16-17, 1958. This was a combined meeting of the Los Angeles Basin Section, the San Joaquin Valley Section and the Coastal Section. The sessions held were on petroleum economics, production, reservoir engineering, drilling and logging, and oil recovery processes.

Tribute was paid to Milan G. Arthur, chairman of the Board of Directors, Los Angeles Basin Section who died recently. There has been established a Milan G. Arthur Memorial Petroleum Engineering Award Fund at the University of California at Berkeley. Information concerning this memorial can be obtained from the Fund Chairman, Nick Van Wingen, 903 Fair Oaks Avenue, South Pasadena, California.

M. J. Taves of Richfield Oil Company was elected chairman of the Los Angeles Basin Section to take Milan Arthur's place, he having served in the interim. The chairmen of the other two sections are:—K. R. Evans, consultant, of the San Joaquin Valley Section and J. R. Severns of Schlumberger, of the Coastal Section.

Nomads to Hold Luncheon During A.P.I.

The annual luncheon of the Nomads will be held on Monday, November 10th at the Conrad Hilton Hotel in Chicago during the A.P.I. meeting. The honored guest and speaker will be E. W. Beck, general purchasing agent of Socony Mobil Oil Company.

DESK AND DERRICK CLUBS ELECT NEW NATIONAL OFFICERS

Elected at the annual convention of the Association of Desk and Derrick Clubs of North America in Los Angeles on October 11th were (from left to right) President, Ellen M. Vaughan of Carter Oil Company; 1st Vice President, Harriett Gregath of Tidewater Oil Company; 2nd Vice President, Jeanne E. Merrill of Phillips Petroleum Company; Secretary, Lucille Barthlow of Leonard Refineries, Inc.; Treasurer, Fae Mattson of Gulf Oil Corporation. Not shown is Anna L. Donley of General Petroleum Corporation, West Coast Representative on the Board of Directors.

Positive Choke Flow Control

A new type positive choke flow control employing the patented access fitting principle has been placed on the market by Cosasco Division of Perfect Circle Corporation, according to Leland Auer, chief engineer.

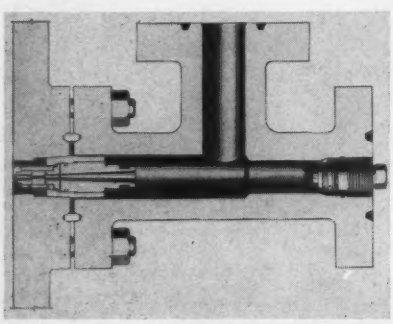
A major advantage claimed for the Cosasco flow control is that it eliminates bulky, expensive valves from oil production flow lines. There are no moving parts subjected to pressure, fluid, distortion or wear, and the choke beans can be easily changed under full operating pressure without system shutdown.

The Cosasco flow control can be used under all pressure and temperature conditions. Operating on the exclusive access fitting principle utilized by Cosasco oilfield and corrosion survey equipment, the flow control has a rated working pressure of 10,000 psi. It can be successfully used, according to Auer, at working pressures in excess of 15,000 psi. The flow control (see cutaway illustration) is identical in construction detail to a standard Cosasco access fitting, except that the gage carrier plug is replaced by a special plug that has a choke bean incorporated in its bore.

Replaceable choke beans are furnished in all orifice sizes from 1/64" to 16/64", in increments of sixty-fourths of an inch. Solid plugs for complete shut-off are also available. The plug and choke bean assembly is easily removed or replaced under full operating pressure by using a Cosasco High-Pressure Retriever through a full-opening valve. By replacing choke beans, the production flow can thus be changed at will without shutting the system down.

Although designed primarily for the flow arms of producing oil wells, the Cosasco flow control can be employed in any line that is threaded for standard 1½" to 4" pipe thread. It can be installed in any Cosasco Unitized Wellhead in a few minutes, and is easily adaptable to all conventional Christmas tree equipment.

Detailed specifications may be obtained by writing to Cosasco Division of Perfect Circle Corporation, 11655 McBean Drive, El Monte, California.



Cosasco Positive Choke Flow Control.

Oilmaster Plunger Bulletin

The Oilmaster Oil Lubricated Plunger is described in a new four page Technical Bulletin EC 5805. It covers operational details, general description, specifications and cataloged parts information. Write or call: Fluid Packed Pump Company, Box 64, Los Nietos, California for Technical Bulletin EC 5805.

Chemical Services Bulletin

A comprehensive bulletin just published by BJ Service reviews each acid treating solution, chemical blocking agent, and auxiliary chemical service offered by BJ for well stimulation. The new bulletin includes a discussion of the composition, purpose, and action of each chemical formulation, together with charts and a glossary of terms used in chemical well-stimulation work. To obtain a copy, address BJ Service, Inc., 6505 Paramount Blvd., Long Beach 5, California, and ask for Chemical Services from BJ.

ANNUAL SALES MEETING OF GROVE VALVE AND REGULATOR COMPANY

Attending the three-day September session in Houston of the domestic and international sales staff of Grove Valve and Regulator Company from South America, Canada, Europe and the United States were the following (from left to right) (back row) George Doty, vice president and general sales manager; Bob Briggs; Clyde Cook; Bill George; Bill Hancock; John Collins; (second row) M. H. Grove, president; Bud Pelusi; Mike Malloy; Ted Roby; E. H. McMenemy; Walt Edrington; John Boynton; (front row) F. Fergusson; Milt Craven; Bill Decker; Chuck Carter; J. C. Hutchinson; Bill Bowden.

America makes SAS *One of the "Big 3" to Europe*

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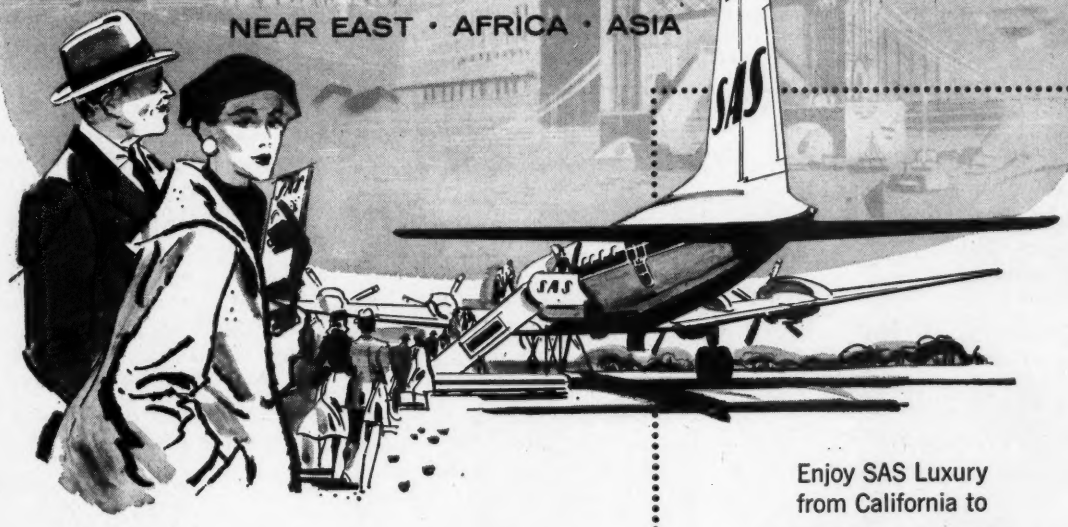

Though there are a dozen airlines to Europe, passengers by actual count make SAS one of the "Big 3" to the Continent. And only SAS flies the direct polar route from California to Europe . . . to all the Near East and Africa.

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Above left—Here is 8⅝", 28-lb. line pipe damaged in transit. The first few joints on the left side of the rack are damaged, crooked and crushed pipe; the joints on the right side of the rack show the repaired pipe after it has been processed by the Oil Tool Portable Hydraulic Pipe Straightener.

Above right—This view shows the operator of the Pipe Straightener in the process of straightening a joint of 8⅝" line pipe. Note the crushed end which will be repaired by the use of internal hydraulic jacks.

New Portable Hydraulic Pipe Straightener

Oil Tool Corporation has announced a new portable hydraulic pipe straightener consisting of a straightener, denting equipment and magnaglo-magnaflux inspecting machine.

With this unit an operator will not only be able to straighten drill pipe and collars at the rig but will also be able to do magnaglo-magnaflux inspection of the tool joints, subs, etc. to save the operator from making separate arrangements for this type of inspection. Another use for the unit will be to service tubular goods that have been damaged in shipment from the mill.

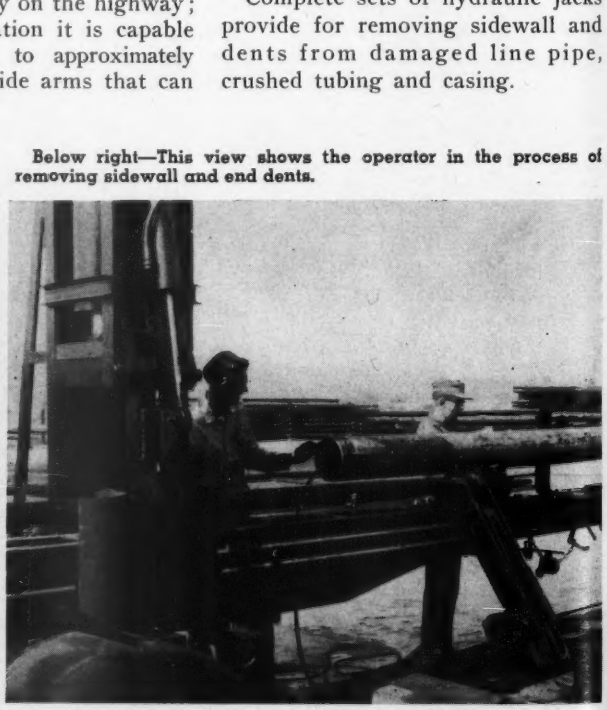
The unit consists of a hydraulic pipe straightener mounted on one axle attached to a small truck by means of a fifth wheel. It obtains its power from a power take-off from the truck motor and, in most instances, is never detached from the truck. The unit is compact enough to be hauled safely on the highway; and at work location it is capable of stretching out to approximately 100 feet. It has side arms that can lift joints of pipe from the ground onto the work rollers. The straightener has both a slow, high-pressure ram for heavy duty and a fast, small ram for light duty.

This unit also carries a small light plant and a magnaglo-magnaflux inspection unit which, when desired, provide for inspection of any tool joints, collars, subs and drill pipe, etc. for hidden flaws or fractures.

Complete sets of hydraulic jacks provide for removing sidewall and dents from damaged line pipe, crushed tubing and casing.

Below left—Here are shown the hydraulic jacks used for removing sidewall and end dents.

Below right—This view shows the operator in the process of removing sidewall and end dents.



American Meter Buys Buffalo Meter Company

The American Meter Company, manufacturers of gas meters and industrial instruments, has reported that its subsidiary, Buffalo Niagara Industrial Controls, Inc., has purchased the Buffalo Meter Company of Buffalo, N. Y., manufacturer of water meters. William G. Hamilton, Jr., president of American Meter and chairman of the board of Canadian Meter Co., will serve as president of the new subsidiary.

Mr. Hamilton was elected a Director of the American Gas Association at the association's annual convention in Atlantic City, on October 13. He has long been active in diversified programs contributing to gas industry progress. Under his direction, American Meter Company was instrumental in originating the Gas Equipment Manufacturers' program of national consumer advertising. He accepted an award in GEM's behalf at the Mid-Year Sales Conference of the Pennsylvania Gas Association in January of 1958.

Mr. Hamilton also played a leading role in instituting the A.G.A. Distribution Achievement Award sponsored by American Meter Company. This award is presented annually to an individual selected by the A.G.A. for his outstanding contribution to the science and art of gas distribution.

Brown Drilling Goes to Guatemala

In a race to tap the promised petroleum riches of the Guatemalan jungle, the Brown Drilling Company of Long Beach, Calif., will fly a new $1,000,000, one million pound rig, into the vastness of the bush. Contract for what will be the biggest air lift of drilling equipment in the history of the petroleum industry has been signed by Art Heiser, vice president of Brown, with The Ohio Oil Company of Guatemala. Working with Heiser on the deal for the multi-million dollar contract was Robert C. Sharp, in charge of foreign sales for Brown. Participating in the negotiations which lead to the contract were J. C. Donnell II, president of Ohio, F. J. Funk, Manager, and R. M. Churchwell, operations manager, Foreign Prod. Group, and H. D. Hoopman, manager of operations Guatemala.

Proposal for the fantastic jungle drilling job involves purchase and assembly by Brown of a rig with capacity beyond 14,000 feet. This will be shipped by water to Puerto Barrios, on the Atlantic Coast of Guatemala. From there it will be loaded in packages of less than 16,000 pounds apiece aboard two giant C-82 flying boxcars and taken more than 100 miles inland to the Peten area where Ohio has secured one of nearly a score of new foreign oil grants.

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF

California Oil World published twice-monthly at Los Angeles 57, California for October 1, 1958.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Petroleum Publishers, Inc., 2404 W. 7th St., Los Angeles 57, Calif. Editor, Wallace A. Sawdon, 2062 Paramount Dr., Los Angeles 28, Calif. Managing Editor, None. Business Manager, Larry O. Miller, 3347 N. Eastbury, Covina, Calif.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.) Petroleum Publishers, Inc., 2404 West Seventh St., Los Angeles 57, Calif. M. Kinzie Miller, 195 So. Grand Ave., Pasadena 2, Calif., Lela S. Monroe, 765 S. Plymouth Blvd., Los Angeles 5, Calif., Estate of Walter C. Monroe, Lela S. Monroe, Executrix, 765 S. Plymouth Blvd., Los Angeles 5, Calif.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

M. KINZIE MILLER
(Signature of President)

Sworn to and subscribed before me this 30th day of September, 1958.
(SEAL) M. E. HUSS
(My commission expires Sept. 4, 1960)

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LAUGH THIS OFF!!

"If you tell a man anything, it goes in one ear and out the other."

"And if you tell a woman anything, it goes in both ears and out her mouth."

"Martha, who broke that chair in the parlor last night?"

"It just collapsed, for no reason, Dad, but neither of us was hurt."

A woman lecturer was going strong. "Yes," she said, "women have suffered in a thousand ways."

"I can think of one way in which women have never suffered, and never will," said a meek little man in the front row.

The lecturer fixed an unbelieving eye on him. "What way is that?" she asked.

"They have never suffered in silence."

Someone has figured out that the peak years of mental activity must be between the ages of four and eighteen. At four, we know all the questions; at eighteen, all the answers.

Wife to husband: "I wish you had the spunk the government has. They certainly don't let being in debt keep them from spending."

As the conductor called out the various names of the city streets, the couple from back in the hills became more and more uneasy. The conductor called "Maple," then "Adams," then "Jones."

The hillbilly, very fidgety, finally turned to his wife and said: "Isn't it time to get off?"

Don't show your ignorance, Matthew," she said. "Wait 'til your name's called."

Farmer (pulling with one mule): Giddap, Zike! Giddap, Jake! Giddap, Pete! Giddap, Mike!

Stranger: "How many names does that mule have?"

Farmer: "One, name's Bill, but he don't know his own strength; so . . . I put blinders on 'im, yell a lot of names and he thinks a lot of other mules are helpin 'im."

A bishop was speaking to a class of boys on the merits of moral courage. "Ten boys were sleeping in a dormitory," he said, by way of illustration, "and only one knelt to say his prayers—that is moral courage." When he had finished his talk he asked one of the boys to give him an example of moral courage.

"Well, sir," said the lad, "ten bishops were sleeping in a dormitory, and only one jumped into bed without saying his prayers!"

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Two String Penetration Successful with M-3 Gun, Ogival Bullets

McCullough M-3 Bullet Perforator Makes Good Well After Bullet Gun of Another Make Fails

After an unsuccessful attempt to get penetration by another service company, this Texas oil well was perforated by a McCullough M-3 Bullet Gun for a good producer.

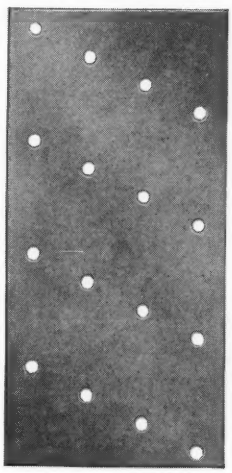
Depth of operation was 5600'. A 5" OD 18 lb. liner had been cemented in 7⅝" OD 29.5 lb. casing which was cemented in open hole.

When first perforated by another make bullet gun, the well failed to respond. McCullough was called and a 3½" OD M-3 Bullet Gun fired 18 improved ½" Ogival Bullets, six per foot, in a three foot zone. Results—a good well and a very satisfied oil man. Time on the job was only two hours.

The greater penetrating power of McCullough M-3 Bullet Perforators has been proved time after time on jobs like this—penetrating two or even three strings of casing, through thick cement sheaths and deep into the producing formation—getting production or increasing production even after others have failed.

For most profitable perforating results—call for hard-shooting McCullough M-3 Bullet Guns.

The job described above is certified to be a true field report of service rendered.



Section of 5" OD casing, unrolled and laid flat to show uniformity of perforation pattern of McCullough M-3, 30-shot Bullet Gun—½" diameter holes, six shots per foot.

McCullough 30-shot M-3 Bullet Perforator. Fires all shots, one to six per foot, at one time. Three or more guns may be connected together and fired on one run.

UNIFORM PERFORATION PATTERN

... means a better oil well

One of the most valuable benefits of McCullough M-3 Bullet Perforating is the uniformity of the perforation pattern in the casing and formation. Shots are placed in a continuous spiral with uniform spacing, coinciding exactly with the pattern of the bullet chambers in the gun itself.

This permits the safe use of more holes per foot in the casing and eliminates the possibility of bunching or scattering the shots. It assures complete, uniform perforation coverage of the entire productive zone, provides maximum drainage area, best possible production.

The uniform perforation pattern combined with the fracturing power of McCullough Ogival Bullets at four to six shots per foot provides ideal conditions for further formation fracturing.

McCullough® TOOL COMPANY

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